IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of			Dated: May 15, 2008
PHILLIP L. WIMMER, CHARLES OTIS and JOSHUA W. SMITH			HP Docket No. 10012053-1
Serial No.	:	10/052,815	Examiner M. Padgett
Filed	:	January 18, 2002	Group Art Unit 1762
For	:	METHOD OF PREPARING A SURFACE FOR ADHESION	

BRIEF OF APPELLANTS (AMENDED)

The Brief of Appellants has been amended pursuant to the Notice of Non-Compliant Appeal Brief dated April 16, 2008 to correct page and line citations to the Specification in Section V (Summary of Claimed Subject Matter) and Section VII (Argument). No other changes were made to the Brief as originally filed.

I. REAL PARTY IN INTEREST

The real party in interest is Hewlett-Packard Development Company, LP, a limited partnership established under the laws of the State of Texas and having a principal place of business at 20555 S.H. 249 Houston, TX 77070, U.S.A. (hereinafter "HPDC"). HPDC is a Texas limited partnership and is a wholly-owned affiliate of Hewlett-Packard Company, a Delaware Corporation, headquartered in Palo Alto, CA. The general or managing partner of HPDC is HPQ Holdings, LLC.

II. RELATED APPEALS AND INTERFERENCES

There are no known related appeals or interferences.

III. STATUS OF CLAIMS

The present application was filed on January 18, 2002 with original claims 1-32. In the response to restriction requirement dated December 17, 2004, Appellants elected the invention of claims 1-26, with traverse; withdrew claim 27, cancelled claims 28, 29, 31 and 32, and added new claims 33-36. In the response dated June 10, 2005, Appellants canceled claims 27 and 30 and amended claim 11. In the response dated November 14, 2005, Appellants canceled claims 6 and 22-24 and amended claims 1, 2, 10, 11, 19 and 21. In the response dated June 12, 2006, Appellants made no changes to the claims. In the response dated November 24, 2006, Appellants amended claims 1, 4, 10, 11, 13, 18, 19 and 21. On February 28, 2007, a final Office action was mailed, from which appellants presently appeal.

Claims 1-5, 7-21, 25, 26 and 33-36 as amended in the response dated November 24, 2006 are the claims at issue in this appeal. Appellants traverse the rejections of all of these pending claims. Appellants do not appeal the rejection of claims 1 and 8 under 35 U.S.C. § 102(b) as anticipated by Burns et al.

IV. STATUS OF AMENDMENTS

No amendments have been made subsequent to the Office action dated February 28, 2007.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The subject matter claimed in the present application is directed to methods for roughening the surface of a substrate to improve the adhesive properties of the substrate. The claimed methods generally involve directing laser radiation toward the substrate to create ablation debris. The ablation debris is allowed to resettle onto the

surface of the substrate, and because the debris typically has a higher ablation threshold than the substrate itself, it can effectively shadow a portion of the surface from receiving further laser radiation. This results in the creation of structures on the surface that can improve the adhesive properties of the surface. *See* page 3, lines 17-22.

More particularly, independent claim 1 and its dependent claims are directed to methods of creating a bond between a substrate and an adhesive.[1] The claimed methods include providing an initiator (56) to a substrate (36), where the initiator is configured to shadow a portion of the surface of the substrate, as depicted in Figs. 4 and 5A-B, and as described in the specification, for example, at page 9, line 28 -- page 10, line 1. As depicted in Figs. 3, 4, and 5A-B (and described, for example, at page 7, lines 15-28; page 9, line 21; and page 10, lines 4-14 of the specification), a laser (30) emitting radiation (38) is directed toward the surface (34) of the substrate (36) to effect ablation of a non-shadowed portion (64) of the substrate, forming structures (66) on the surface of the substrate. As shown at (68) in Fig. 4 (and as described in the specification at page 10, lines 28-29), an adhesive (70) is then applied to the surface (34) of the substrate (36).

Independent claim 10 and its dependent claims also are directed to methods of creating a bond between a substrate and an adhesive. The claimed methods include directing laser radiation (38) toward the surface (34) of the substrate (36) to effect ablation of the substrate and to create ablation debris (60), as shown in Figs. 3, 4, and 5A-B (and described in the specification at page 7, lines 15-29; page 9, line 21; page 10,

[1] As noted previously, appellants do not appeal the rejection of claims 1 and 8 under 35 U.S.C. § 102(b) as anticipated by Burns et al. However, as described below, appellants do appeal the rejection of claims 1 and 8 on other grounds.

lines 4-14; and page 11, lines 23-24). As shown in Figs. 4, 5A-B (and described at page 13, lines 4-18, and at page 11, lines 28-31), the ablation debris (60) is resettled on the surface (34) to shadow a portion of the surface from laser radiation, and additional laser radiation (38) is directed toward the surface (34) at an intensity sufficient to cause ablation of the substrate, but not sufficient to cause substantial ablation of the surface, thereby forming structures (66) on the surface of the substrate. As shown at (68) in Fig. 4 (and described in the specification at page 10, lines 28-29), an adhesive (70) is then applied to the surface (34) of the substrate (36).

Independent claim 18 and its dependent claims are directed to methods of bonding an adhesive to a substrate. The claimed methods include directing a laser (30), which emits radiation (38), at a surface (34) of the substrate (36) to cause ablation of the surface and formation of ablation debris (60), as shown in Figs. 3, 4, and 5A-B (and described in the specification at page 7, lines 15-28; page 9, line 21; page 10, lines 4-14 and page 11, lines 23-24). The claimed methods also include adjusting the fluence of the laser between an ablation threshold of the substrate (36) and an ablation threshold of the ablation debris (60) (as described at page 11, lines 28-31); ablating the surface (34) of the substrate (36) to progressively cover the surface with ablation debris (60) to form raised structures (66) on the surface (34) of the substrate (36), as shown in Figs. 4, 5A-B (and described at page 11, line 31 -- page 12, line 2); and applying an adhesive (70) to the surface (34) of the substrate (36) after formation of the structures (66), as shown at (68) in Fig. 4 (and described in the specification at page 10, lines 28-29).

Independent claim 21 and its dependent claims are directed to methods of eliminating interfacial failure between a component and an adhesive in a print cartridge

assembly. *See generally* page 1, line 28 -- page 2, line 4, and Fig. 1 showing components (12), (14), and (16) of a print cartridge (10). Surface (34), shown in Figs. 3, 4, and 5A-5B, can be the surface of any of components (12), (14), or (16), among others. The claimed methods include directing a laser (30) at the surface (34) of the component, and shadowing a portion of the surface (34) with ablation debris (60) formed by ablation of the surface (34) to form a higher threshold ablation region (58) (the shadowed region) and a lower threshold ablation region (64) (the non-shadowed region). This is shown in Figs. 3, 4, and 5A-B (and described in the specification at page 7, lines 15-29; page 9, line 21; page 9, line 28 – page 14, line 10; and page 11, lines 23-24). The methods further include adjusting the laser to ablate the lower threshold region (64) at a rate faster than ablation of the higher threshold ablation region in order to form structures (66) on the surface of the component. The methods further include applying an adhesive (70) to the surface (34) after formation of the structures (66), as shown at (68) in Fig. 4 (and described in the specification at page 10, lines 28-29).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. Whether claims 1-20 and 33-36 were improperly rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention.

B. Whether claims 1-5, 7-8, 10-16, 18-20, 33 and 36 were improperly rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Publication No. 2005/0242059 A1, which has matured into U.S. Patent No. 6,919,162, to Brennen et al.

("Brennen"), optionally in view of "The effect of debris formation on the morphology of excimer laser ablated polymers" by Taylor et al. ("Taylor").

C Whether claims 1-5, 7-8, 10-16, 18-20, 33 and 36 were improperly rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,172,473 to Burns et al. ("Burns"), optionally in view of Taylor.

D. Whether claims 9, 17, 21, 25-26 and 34-35 were improperly rejected under 35 U.S.C. § 103(a) as being unpatentable over Brennen, optionally in view of Taylor, and further in view of U.S. Patent No. 6,120,131 to Murthy et al. ("Murthy").

VII. ARGUMENT

A. Rejection of Claims 1-20 and 33-36 Under 35 U.S.C. § 112

Claims 1-20 and 33-36 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Appellants assert that a rejection on this basis is inappropriate because a person having ordinary skill in the art would be able to determine the scope of the claimed subject matter. "If the scope of the claimed subject matter can be determined by one having ordinary skill in the art, a rejection using this form paragraph would not be appropriate." *MPEP § 706.03(d)*.

1. Independent Claims 1, 10 and 18

The Examiner states that "[i]n independent claims 1, 10 and 18 applicants have added the requirement of a bond between the substrate and adhesive in the preambles, which is not commensurate in scope with the body of the claims, because while all of the claims require applying an adhesive to the substrate, there is no requirement that a

'bond' is created between the 'adhesive' and substrate." *OA of 2-28-2007*, pp. 4-5. Applicants disagree for several reasons. First, alteration of the claim preambles during prosecution was not intended to add the "requirement of a bond" to the claims. Rather, this phrase was added so that the intended use set forth in the preambles is more apparently consistent with the scope of claims 1, 10 and 18, each of which includes the feature of "applying an adhesive to the surface of the substrate." Thus, "creating a bond between a substrate and an adhesive" more clearly reflects the intended use of the invention than the previous preamble "preparing a surface for adhesion," although preparing a surface for adhesion is also an intended use of the invention.

Second, applicants disagree with the Examiner's statement that creation of a bond between the substrate and the adhesive is not commensurate in scope with the body of the claims. Applicants believe that a person of ordinary skill in the art would recognize that when an adhesive is applied to a substrate, a bond is formed between the adhesive and the substrate. Even if this were not plainly apparent, applicants' statement (among others) in the original specification that an adhesive or coating may "conform to and bond to" a substrate provides ample intrinsic support for the proposition that an adhesive bonds to a substrate. *Specification*, page 2, lines 1-10.

Next, the Examiner states that applicants' "nonstandard" use of "adhesive" gives rise to a need for clarification as to how a bond is created between the substrate and the adhesive. Applicants disagree that they have used "adhesive" in a nonstandard manner. A standard dictionary definition of "adhesive" is "[a] substance, such as paste or cement, that provides or promotes adhesion." *The American Heritage Dictionary of the English Language*, Fourth Edition, 2004. Applicants state at page 6, lines 15-17 of

the specification that "[a]dhesive includes any material that provides or promotes adhesion between the substrate and the material itself." Thus, applicants believe that their use of "adhesive" is standard, and that this use is entirely consistent with a bond being created between the applied adhesive and a substrate. In light of this, applicants believe that their use of "bond" and "adhesive" allows a person of ordinary skill in the art to understand the scope of the pending claims.

Finally, applicants wish to note that their definition of "adhesive" does not rely on their amendment filed on 11/24/2006, to which the Examiner objected as introducing new matter into the disclosure. The language "[a]dhesive includes any material that provides or promotes adhesion between the substrate and the material itself" at page 6, lines 19-21 of the specification was not introduced in an amendment, but rather was included in the original specification as filed on 1/18/2002. The amendment to which the Examiner objected occurs in the subsequent sentence, which reads (showing the amendment in bold and underlined type) "[a]ny material that may flow or conform and adhere to the surface of the substrate **and that provides or promotes such adhesion** may be an adhesive." The admittedly somewhat redundant language "and that provides or promotes such adhesion" was added to the specification to reiterate the meaning of adhesive, rather than to introduce a new meaning. Thus, while applicants would be willing to cancel the allegedly new matter in future prosecution, they do not believe that their amendment has added new matter, and they wish to clarify that their asserted definition of "adhesive" does not rely upon any amendment of the specification.

2. Dependent Claims 3 and 4

The Examiner states with regard to dependent claim 3 that "it is impossible for particles incorporated in the substrate to shadow the surface of that substrate, since they are not in position to prevent light directed at the surface for reaching the surface [sic] no matter how you define a shadow." *OA of 2-28-2007*, p. 5 (emphasis in original). Applicants disagree, and believe that the claim itself supports an unambiguous alternative interpretation. Claim 3 states in its entirety:

> The method of claim 1, wherein providing an initiator includes providing a substrate incorporating particles with an ablation threshold higher than an ablation threshold of the surface of the substrate.

By claiming "particles" separately from "the surface of the substrate," the claim makes clear that the particles are separate from the underlying substrate. Thus, the substrate can (and does) have a surface independent from the particles, and that surface is partially covered by the incorporated particles. However, the underlying surface is still present as a separate entity, merely being partially shadowed by the particles. The fact that the particles are incorporated into the surface is not inconsistent with this. A standard definition of "incorporate" is "[t]o unite (one thing) with something else already in existence." *The American Heritage Dictionary of the English Language*, Fourth Edition, 2004. Nothing in this definition requires that the objects united together forego their individual identities to become a single object. Thus, in the present case, incorporating particles into the surface of the substrate does not require that the

particles and the surface become an indistinguishable single entity. It follows that the particles and the surface may have different ablation thresholds.

The Examiner states with respect to dependent claim 4 that the claim requires "something that is completely impossible, since due to use of past tense, it requires the structures to be formed before providing the initiator, or one could not determine what has not yet been formed." Applicants disagree that the language of claim 4 suggests something impossible, but are willing to amend claim 4 in accordance with the Examiner's suggested language "determining the desired size . . . of the structures **to be** formed . . ." in the event that prosecution of this application is reopened.

For the reasons set forth above, appellants appeal the rejection of claims 1-20 and 33-36 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

B. Rejection of Claims 1-5, 7-8, 10-16, 18-20, 33 and 36 Under 35 U.S.C. § 103

Claims 1-5, 7-8, 10-16, 18-20, 33 and 36 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Brennen, optionally in view of Taylor. Appellants assert that the Examiner has applied an improper standard for determining the obviousness of the claimed subject matter, and that even in combination, the Brennen and Taylor references fail to establish the *prima facie* obviousness of the claimed subject matter.

To establish *prima facie* obviousness, the Examiner must satisfy three criteria. *See MPEP* §706.02(j). There must be some suggestion or motivation present in the prior art to modify the reference or to combine the reference teachings. *MPEP* §2143.01 (citing *In re Kahn*, 441 F.3d 977, 986; 78 USPQ2d 1329, 1335 (Fed. Cir. 2006)). The

prior art must also provide a reasonable expectation of success. Additionally, the prior art references must teach or suggest each and every element of the claim. Appellants assert that Brennen and Taylor do not teach or suggest every element of the pending claims, and further that these references fail to provide a motivation to combine, and in fact teach away from such a combination. A *prima facie* case of obviousness can be rebutted if the prior art in any material respect teaches away from the claimed invention. *MPEP §2144.05* (citing *In re Geisler*, 116 F.3d 1465, 43 U.S.P.Q.2d 1362 (Fed. Cir. 1997)).

In the pending application, independent claims 10, 18 and 21, as well as dependent claim 2, each include a feature related to formation of structures on the surface of a substrate resulting from ablating the surface with a laser, and then using the resettled, ablated material to shadow portions of the surface and thus to promote structure formation. In addition, all of the pending claims include the feature of applying an adhesive to the roughened surface. As described below, appellants assert that the Brennen and Taylor references cited by the Examiner fail to disclose these features either explicitly or inherently, fail to offer any motivation to modify or combine to form the claimed invention, and in fact each teach away from such a modification or combination.

1. Rejections Based Solely on Brennen

The Examiner has acknowledged during prosecution that Brennen does not explicitly teach either deposition of ablation debris material to shadow a portion of a surface and form structures such as cones (OA of 8-23-2006, p. 10), or applying an adhesive to the surface after formation of the structures (OA of 2-28-2007, p. 7). With regard to deposition of ablation debris to shadow the surface, the Examiner states that

"it may be considered inherent in the cone formation process with the control fluences as discussed." Appellants disagree. For a feature to be inherent, "the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted); see also *MPEP* §2163.07(a). In this case, as described in detail below, cone formation specifically due to shadowing by ablation debris is not necessarily present in the cone formation process described by Brennen, and in fact to the extent that Brennen suggests a mechanism for its cone formation, it teaches away from shadowing by ablation debris.

Brennen teaches texturing substrates via laser ablation, including controlling laser fluence to affect the amount of ablation (for example, at '059, paragraph [0058]). However, neither deposition of ablated debris material nor resulting formation of cone initiators in the sense of applicants' claims is inherent in the disclosure of Brennen, because neither is necessarily present in the texturing described by Brennen. At [0086], Brennen discloses that "cone formation occurs when the fluence of a laser pulse at the substrate is not high enough to completely remove a whole layer of material. Even a small particle of material that remains of the previous layer may be enough to initiate the formation of a cone or cone-like feature . . . " This description contemplates structure formation resulting from the presence of non-ablated material, and thus specifically teaches away from appellants' claimed feature of initiating structure formation with

ablation debris, by tuning the intensity of the laser to ablate the substrate but not the debris.

Further, although Brennen describes the production of ablation debris, Brennen does not contemplate allowing this debris to resettle on the surface, or tuning the laser so that the debris shadows the surface and initiates structure formation. At [0095], for example, Brennen discloses ablating polymer material "to achieve rapid ejection of ablated material with essentially no heating of the surrounding material." Such rapid ejection does not imply resettling of the ablation debris onto the surface, and the emphasis within Brennen on the use of extrinsic masks to effect surface texturing suggests that such masks may be necessary to produce surface texturing because the ablated material does not in fact resettle. This could occur, for example, if the surface of the substrate is ventilated to cool the surface or specifically to remove the debris, or if the laser is pulsed sufficiently rapidly or with sufficient intensity that debris is continually reheated and ejected before it resettles on the surface, among other reasons. Appellants assert that not only is cone formation due to shadowing by ablation debris not *inherent* in the teachings of Brennen, but that in fact, "rapid ejection" is *unlikely* to result in resettled debris that is useful for subsequent structure formation.

The Examiner notes, and applicants acknowledge, that Brennen discusses formation of "cones" near the ablation threshold of the substrate ('059, [0126-0133]). However, the mere use of the term "cones" in Brennen does not indicate formation of cones from shadowing by ablation debris in the sense of applicants' claims, for at least the same reasons as discussed above. As the Examiner notes (OA of 8-23-2006, p. 11), Brennen cites the 1993 Krajnovich et al. article (73 J. Appl. Phys. 3001) as an

example of the same or a similar cone formation process as that described in Example 1 of Brennen. Yet the Krajnovich article specifically characterizes its own study as "proving that ablation debris is *not* the initiating factor" in forming the observed cones (abstract, emphasis added). Further, Krajnovich et al. provides a completely different explanation for the observed cones, proposing that "radiation hardening, in the form of carbon enrichment, is responsible for the effects reported" (p. 3006, col. 1). Therefore, Krajnovich et al. makes it apparent that the mere presence or formation of cones in a laser ablation process does not imply that the cones were formed as a result of shadowing by ablation debris. More particularly, in light of the possibility—specifically cited by Brennen—that the cones of Brennen were formed by carbon enrichment due to radiation hardening (as proposed by Krajnovich et al.), formation of cones due to shadowing by ablation debris cannot be an inherent feature in the cone formation process described by Brennen.

For the reasons set forth above, appellants appeal the rejection of claims 1-5, 7-8, 10-16, 18-20, 33 and 36 under 35 U.S.C. § 103(a) as being unpatentable over Brennen et al.

2. Rejections Based on Brennen in View of Taylor

Alternatively, the Examiner states that claims 1-5, 7-8, 10-16, 18-20, 33 and 36 are obvious over Brennen in view of Taylor. Again, applicants respectfully disagree. As noted previously, a *prima facie* case of obviousness requires some teaching, suggestion, or motivation to combine or modify the teachings of the prior art. *MPEP* §2143.01. As the Examiner acknowledges, and as described above, Brennen contains no explicit teaching of cone formation by ablation debris, and the only mechanism of cone

formation suggested by Brennen stems from its reference to the Krajnovich paper, which proposes that cone formation is due to radiation hardening, and specifically disclaims cone formation due to shadowing by ablation debris. In fact, as noted in the previous section, Krajnovich definitively states that "ablation debris is *not* the initiating factor" in forming the observed cones (abstract, emphasis added), so that by referencing Krajnovich Brennen explicitly teaches away from forming cones by shadowing from resettled ablation debris. Therefore, Brennen does not offer any teaching, suggestion, or motivation to modify its teachings or to combine them with another reference to arrive at cone formation due to shadowing by debris, with or without subsequent application of an adhesive.

Similarly, Taylor does not teach forming cones from ablation debris for the purpose of promoting adhesion, and teaches away from such a beneficial use of cone formation. While Taylor does discuss formation of debris cones, Taylor indicates only that debris cones may be *undesirably* formed during laser ablation of a substrate, noting that such debris formation may be eliminated by increasing laser fluence. "[H]igher fluences are required to totally remove the cone formation from large diameter cuts." (Taylor, p. 2817). Taylor thus specifically identifies a mechanism for *avoiding* settling of ablation debris on a substrate to form cones, and therefore teaches away from forming cones for promoting adhesion to the substrate. Because Taylor does not disclose the step of applying an adhesive to an ablated surface, does not offer any teaching, suggestion or motivation to modify its teachings to include that feature, and teaches away from retaining cones for promoting adhesion, appellants assert that the combination of Taylor with Brennen is an improper basis for an obviousness rejection.

For the reasons set forth above, appellants appeal the rejection of claims 1-5, 7-8, 10-16, 18-20, 33 and 36 under 35 U.S.C. § 103(a) as being unpatentable over Brennen in view of Taylor.

C. Rejection of Claims 1-5, 7-8, 10-16, 18-20, 33 and 36 under 35 U.S.C. § 103(a)

The Examiner rejected claims 1-5, 7-8, 10-16, 18-20, 33 and 36 under 35 U.S.C. § 103(a) as being unpatentable over Burns, optionally in view of Taylor. Appellants assert that the Examiner failed to establish a *prima facie* case of obviousness because Burns and Taylor fail to teach or suggest all of the elements of the claims at issue, as required by *MPEP* §706.02(j). Appellants further assert that even if such a *prima facie* case was established, it is rebutted by because Burns and Taylor each teach away from the proposed combination. *MPEP* §2144.05.

1. Rejections Based Solely on Burns

Burns teaches laser ablation "through a projection mask of dots to form an array of polyimide cones" (Col. 6, lines 49-50). Burns further teaches that "[t]he array thus formed is subjected to plasma etching to remove polyimide debris left behind from the laser ablation" (Col. 6, lines 51-53). Thus, Burns fails to teach or suggest forming cones by shadowing with ablation debris, and also teaches away from such a process by specifically providing a mechanism for removing the debris from the substrate. As noted previously, the feature of shadowing with ablation debris to promote structure formation is includes in pending independent claims 10, 18 and 21, and in pending dependent claim 2.

The Examiner points to the statement in the abstract of Burns that "[t]he individual conical projections are comprised of an ablative material" as indicating the

possibility that the cones of Burns are formed from ablation debris, while acknowledging the alternative reading that the cones are comprised of a material that merely can be (but has not been) ablated. Appellants assert that only the latter reading is reasonable, in light of the fact that the specification of Burns teaches only ablation through an opaque mask, with formation of cones under the mask, and makes no mention of forming cones through the accumulation of debris. Because Burns does not teach or suggest forming cones by shadowing with ablation debris, and teaches away from such formation by suggesting a way to remove any excess debris, appellants assert that an obviousness rejection based on Burns is improper.

For the reasons set forth above, appellants appeal the rejection of claims 1-5, 7-8, 10-16, 18-20, 33 and 36 under 35 U.S.C. § 103(a) as being unpatentable over Burns.

2. Rejections Based on Burns in View of Taylor

As described in the preceding section, Burns does not teach or suggest the formation of cones via shadowing a surface with ablation debris, and in fact teaches away from this process. Furthermore, also as described previously, Taylor does not teach forming cones from ablation debris for the purpose of promoting adhesion, and teaches away from such beneficial use of cone formation. *See* Section VII.B.2 above. Since both Burns and Taylor teach away from the claimed invention, appellants assert that an obviousness rejection based on the combination of these references is improper. Thus, appellants appeal the rejection of claims 1-5, 7-8, 10-16, 18-20, 33 and 36 under 35 U.S.C. § 103(a) as being unpatentable over Burns in view of Taylor.

D. Rejection of claims 9, 17, 21, 25-26 and 34-35 under 35 U.S.C. § 103(a) as being unpatentable over Brennen, optionally in view of Taylor, and further in view of Murthy

Claims 9, 17, 25-26 and 34-35 are all dependent claims directly or indirectly referencing a print cartridge. Similarly, claim 21 is an independent claim directed to forming structures on a surface via shadowing by ablation debris, where the surface is a surface of a component in a print cartridge assembly. In rejecting these claims, the Examiner relied on the same arguments as in the previous rejections based on Brennen and/or Taylor, while relying on Murthy for teachings specifically related to adhesion of print cartridge components. Appellants repeat their assertion that any rejection based on Brennen and/or Taylor is improper because these references fail to teach or suggest all of the elements of the pending claims (even aside from those related to print cartridges), and because both Brennen and Taylor teach away from the claimed invention. *See* Sections VII.B and VII.C above.

For the reasons set forth above, appellants appeal the rejection of claims 9, 17, 21, 25-26 and 34-35 under 35 U.S.C. § 103(a) as being unpatentable over Brennen, optionally in view of Taylor, and further in view of Murthy.

E. Conclusion

Appellants do not appeal the rejection of claims 1 and 8 under 35 U.S.C. § 102. With regard to the rejections based on 35 U.S.C. § 112, appellants assert that these rejections are improper because a person having ordinary skill in the art would be able to determine the scope of the claimed subject matter. With regard to the rejections based on 35 U.S.C. § 103, appellants assert that the cited references do not teach or

suggest every element of the rejected claims, and further that Brennen, Taylor and Burns each teach away from the Examiner's proposed combination. In light of this, appellants respectfully request withdrawal of the rejection of claims 2-5, 7, 9-21, 25, 26 and 33-36 as amended in the response dated November 24, 2006.

VIII. CLAIMS APPENDIX

1. A method of creating a bond between a substrate and an adhesive, the method comprising:

providing an initiator to a substrate, the initiator configured to shadow a portion of a surface of the substrate;

directing a laser toward the surface of the substrate to effect ablation of a non-shadowed portion of the substrate, forming structures on the surface of the substrate; and

applying an adhesive to the surface of the substrate after formation of the structures.

2. The method of claim 1, wherein providing an initiator includes resettling ablation debris, which results from initial ablation of the surface of the substrate, on the surface of the substrate where the ablation debris has a higher ablation threshold than the surface of the substrate.

3. The method of claim 1, wherein providing an initiator includes providing a substrate incorporating particles with an ablation threshold higher than an ablation threshold of the surface of the substrate.

4. The method of claim 3, wherein providing an initiator also includes determining the desired size, shape and density of the structures formed by ablation of the substrate, and selecting an appropriate number of particles to form the desired density of structures.

5. The method of claim 1, wherein providing an initiator includes spreading particles on the surface of the substrate where the particles have an ablation threshold higher than an ablation threshold of the surface of the substrate.

7. The method of claim 1, wherein the substrate is formed from a liquid crystal polymer or a polyimide.

8. The method of claim 1, wherein the substrate is formed from a polyimide.

9. The method of claim 1, wherein the substrate is an element of a print cartridge assembly.

10. A method of creating a bond between a substrate and an adhesive, the method comprising:

a first step of directing laser radiation towards the surface of the substrate to effect ablation of the substrate and create ablation debris, the ablation debris having a higher ablation threshold than the surface of the substrate;

after the first step of directing laser radiation towards the substrate surface, resettling the ablation debris on the substrate surface to shadow a portion of the surface from laser radiation;

after resettling the ablation debris on the substrate surface, a second step of directing laser radiation towards the surface of the substrate at an intensity sufficient to cause ablation of the substrate, but not sufficient to cause substantial ablation of the debris, thereby forming structures on the surface of the substrate; and

applying an adhesive to the surface of the substrate after formation of the structures.

11. The method of claim 10, which further comprises, prior to the first step of directing laser radiation towards the substrate, providing an initiator configured to shadow a portion of the surface of the substrate.

12. The method of claim 11, wherein providing an initiator includes providing a substrate incorporating particles with an ablation threshold higher than an ablation threshold of the surface of the substrate.

13. The method of claim 11, wherein providing an initiator also includes determining a desired size, shape and density of structures and selecting an appropriate number of particles to form the desired density of structures.

14. The method of claim 11, wherein providing an initiator includes spreading particles on the surface of the substrate where the particles have an ablation threshold higher than an ablation threshold of the surface of the substrate.

15. The method of claim 10, wherein the substrate is formed from a liquid crystal polymer

16. The method of claim 10, wherein the substrate is formed from a polyimide.

17. The method of claim 10, wherein the substrate is an element of a print cartridge assembly.

18. A method of bonding an adhesive to a substrate, the method comprising:

directing a laser at a surface of a substrate to cause ablation of the surface and formation of a first amount of ablation debris;

after formation of the first amount of ablation debris, adjusting the fluence of the laser between an ablation threshold of the substrate and an ablation threshold of the ablation debris;

after adjusting the fluence, further ablating the surface of the substrate so as to progressively cover the surface of the substrate with a second amount of ablation debris to effect formation of raised structures on the surface of the substrate; and

applying an adhesive to the surface of the substrate after formation of the structures.

19. The method of claim 18, wherein further ablating the surface of the substrate so as to progressively cover the substrate with the second amount of ablation debris includes progressively resettling the second amount of ablation debris on the surface of the substrate such that the surface is increasingly covered with ablation debris, and ablating an uncovered portion of the surface to form structures on the surface.

20. The method of claim 18, wherein the substrate is formed from a liquid crystal polymer.

21. A method of eliminating interfacial failure between a first component and an adhesive in a print cartridge assembly, the method comprising:

directing a laser at a surface of a first component;

shadowing a portion of the surface of the first component with ablation debris formed by ablation of the surface of the first component to form a higher threshold ablation region and a lower threshold ablation region;

adjusting the laser to ablate the lower threshold ablation region at a rate faster than ablation of the higher threshold ablation region in order to form structures on the surface of the first component; and

applying an adhesive to the surface of the first component after formation of the structures.

25. The method of claim 21, wherein the first component is a print cartridge body.

26. The method of claim 21, wherein the first component is a flex circuit.

33. The method of claim 1, wherein the structures formed on the surface of the substrate are approximately between two and five microns in height.

34. The method of claim 1, wherein the surface of the substrate is a surface of a print cartridge body.

35. The method of claim 1, wherein the surface of the substrate is a surface of a flex circuit.

36. The method of claim 10, wherein the structures formed on the surface of the substrate are approximately between two and five microns in height.

IX. EVIDENCE APPENDIX

None.

X. RELATED PROCEEDINGS APPENDIX

None.

Respectfully submitted,

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